

MEMORANDUM | September 8, 2014

TO U.S. Fish and Wildlife Service (Service)
FROM Industrial Economics, Incorporated (IEc)
SUBJECT Supplemental Information on Land Values – Critical Habitat Designation for the Dakota Skipper and Poweshiek Skipperling

This memorandum provides supplemental data supporting the conclusion that the designation of critical habitat for the Dakota skipper (*Hesperia dacotae*) and Poweshiek skipperling (*Oarisma poweshiek*), hereafter “two butterflies,” is unlikely to reach the threshold of an economically significant rulemaking, with regard to costs, under Executive Order (E.O.) 12866.¹ Specifically, it considers whether public perception regarding land use restrictions may result in land value reductions approaching this threshold. The available economics literature is insufficient for a quantitative assessment of the effects of public perception of critical habitat on land values.

Absent necessary data, this memorandum provides an estimate of the value of all privately-owned lands within proposed critical habitat (excluding privately-owned conservation lands).² This value is not presented as an estimated cost of critical habitat. Rather, it defines an upper bound on the possible effects of public perception. This value, combined with the compliance costs that could result from designation of critical habitat for the two butterflies, does not reach the threshold for an economically significant rulemaking under E.O. 12866.

SECTION 1. BACKGROUND

Concurrent with this effort, we prepared a separate memorandum for the Service estimating the likely section 7 costs of the proposed critical habitat designation for the two butterflies. As discussed in that memorandum, we conclude that forecast costs under section 7 of the Endangered Species Act (the Act) are likely to be limited to the administrative effort associated with the consultation process in occupied habitat. In unoccupied habitat, incremental section 7 costs will include both the administrative costs of consultation and the costs of developing and implementing conservation measures needed to avoid adverse modification of critical habitat, such as rerouting pipelines, adding fencing or altering the timing and area of prescribed burns on critical habitat.

¹ See Industrial Economics, Incorporated (2014).

² We exclude private lands that are already conserved by non-profit conservation organizations including The Nature Conservancy and The Michigan Nature Association. These lands are already restricted from future development and/or intensive agricultural uses; thus, the proposed designation is unlikely to diminish their value.

Comments received regarding this and prior critical habitat designations in various locations throughout the United States indicate that the public perceives critical habitat as potentially resulting in incremental changes to private property values, above and beyond those associated with specific forecast project modifications under section 7 of the Act.³ These commenters believe that, all else being equal, a property that is inhabited by a threatened or endangered species, or that lies within a critical habitat designation, will have a lower market value than an identical property that is not inhabited by the species or that lies outside of critical habitat. This lower value results from the perception that critical habitat will preclude, limit, or slow development, or somehow alter the highest and best use of the property (e.g., agriculture).

Specifically, the Service received a comment on the proposed rule to designate critical habitat for the two butterflies stating, “In South Dakota, land that is designated as critical habitat under ESA is likely to be valued differently (lower) than a tract of similar land not so designated because future perspective buyers of that property will be wary of ESA.”⁴ Further in its incremental memo, the Service notes “there is a strong belief among landowners that designation of private lands as critical habitat would impact property values. Landowners indicated that land brokers or auctioneers should be contacted to get a sense of how much impact a critical habitat designation may have on resale value of that property.”^{5,6}

Public attitudes about the limits and costs that the Act may impose can cause real economic effects to the owners of property, regardless of whether such limits are actually imposed. Over time, as public awareness grows of the regulatory burden placed on designated lands, particularly where no Federal nexus compelling section 7 consultation exists, the effect of critical habitat designation on properties may subside.

Ideally, to estimate the amount by which land values may be diminished and the duration of this effect, we would conduct a retrospective study of existing critical habitat designations. We would use statistical analysis of land sales transactions to compare the value of similar parcels located within and outside of critical habitat. However, such primary research, which requires substantial collection and generation of new data, is beyond the scope of this effort. Furthermore, while some research has been conducted on the effect of the Act on perception and land use decisions, the results of these studies are not transferrable to this situation.

³ See, for example, public comments on the possible cost of designating private lands as critical habitat for the Northern spotted owl (as summarized in Industrial Economics, Incorporated. 2012. *Economic Analysis of Critical Habitat Designation for the Northern Spotted Owl: Final Report*. Prepared for the U.S. Fish and Wildlife Service. p. 5-21) and the cactus ferruginous pygmy owl (as summarized in Industrial Economics, Incorporated. 1999. *Economic Analysis of Critical Habitat Designation for the Cactus Ferruginous Pygmy-Owl*. Prepared for the U.S. Fish and Wildlife Service. p. 44).

⁴ Public comments on the October 24, 2013 proposals to list the Dakota skipper and Poweshiek skipperling along with critical habitat. Submitted by F. William Whipple, President, Whipple Ranch Inc., received by the Service December 27, 2013.

⁵ U.S. Fish and Wildlife Service. May 6, 2014. Incremental Effects Memorandum for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Dakota skipper (*Hesperia dacotae*) and the Poweshiek skipperling (*Oarisma poweshiek*).

⁶ We do not contact land brokers or auctioneers for this analysis because these individuals may be subject to the same perception bias as the general public. Rather, in a later paragraph, we describe the conceptually correct method for quantifying possible property value effects.

Specifically, several published studies provide evidence that public perception can result in material effects, even absent participation in a section 7 consultation. For example:

- List et al. (2006) examined the effect of the publication of the proposed critical habitat boundaries for the cactus ferruginous pygmy owl near Tucson, Arizona. The authors found that vacant land parcels included in the proposal were developed on average about one year earlier than similar, non-critical habitat parcels. The authors suggest this preemptive behavior was a response to the proposal based on the perception that the final designation could impede landowners' ability to develop these parcels. They acknowledge that the landowner would have developed the land in any case, suggesting that "such a shift can, however, carry a considerable economic cost, and in some circumstances the landowner might not have opted to destroy the habitat had he observed how land prices actually evolved." List et al. also compare land prices within and outside proposed critical habitat and found that "undeveloped land fell in value by about 22% if it was within the critical habitat boundaries."
- Lueck and Michael (2003) find that landowners in North Carolina preemptively prevent the establishment of old-growth pine stands by harvesting more frequently to ensure that endangered red-cockaded woodpeckers (RCWs) do not inhabit their land. The authors find that increasing proximity to known woodpecker locations results in a 6.8 percent increase in the probability that the plot will be harvested and decreases the age at which the forest is harvested by several years. The authors interpret the latter finding as suggesting that not all landowners make small adjustments (a few years) to harvest age. Rather, they believe a small number of owners make large adjustments in optimal harvest age (e.g., assuming 10 percent of landowners switch from a 70- to 40-year rotation would be consistent with a 3-year decrease in the average harvest age). The reduction from a less than optimal stand rotation schedule presumably imposes costs on the landowners in terms of a lower net present value of the harvest.
- Zabel and Paterson (2006) conducted an analysis of building permits issued by California municipalities with and without critical habitat. They found that critical habitat had a statistically significant causal effect on the issuance of permits for single-family houses during the period spanning 1990 through 2002. The largest portion of the effect was attributable simply to whether critical habitat was present in the municipality. The reduction in housing permits also varied in relation to the size of the designation, but this effect was a much smaller portion of the overall effect. These results suggest that critical habitat "acts as a signal that all development in the municipality will be more costly." The authors did not find evidence of preemptive behavior.

Collectively, these studies suggest that concerns about possible project delays or the imposition of land use restrictions can lead to changes in the use, and therefore value, of designated parcels and in the overall amount of economic activity undertaken in the designation. Whether the results of these studies are predictive of the effect of designating critical habitat for other species depends on whether the factors contributing to the effects

measured in these cases also apply to new designations. Furthermore, this limited number of studies is unlikely to encompass the full range of possible perception-related effects.

Characteristics of a designation that might influence the magnitude of the effect caused by public perception include: (1) whether adequate substitute sites are available for the same activities; (2) whether the community has experience with section 7 requirements; (3) whether the actual effect of future section 7 consultations could be economically significant; (4) the level of baseline demand for the land uses of concern; and (5) the time required to undertake development permitting activities under baseline conditions. Furthermore, the length of time over which the effect persists, and the rate at which it diminishes, will be influenced by these factors.

For example, for critical habitat designations in areas with large amounts of alternative suitable land for agricultural activities, the effect on designated property may be more significant and longer lasting. In this situation, it may be relatively easy for farmers to purchase lands outside of critical habitat, rather than inside, thus reducing the presumed value of the critical habitat lands for agricultural activities. If a designated area has no reasonable substitute, prospective buyers are more likely to work with the Service to develop project modifications that allow them to make use of the critical habitat as originally planned. In both cases, such effects would only occur if demand for the productive use of those lands exists in the baseline.

In another example, if a community has experience with the Act, landowners may be more sophisticated in their understanding of the true implications of the designation. Under such conditions, adverse effects based on perception alone may be minimized or shorter-lived. In addition, understanding of the degree to which future section 7 consultations could delay or affect land use may influence the amount of preemptive action taken by landowners. If critical habitat for a given species is likely to require relatively onerous restrictions in order to avoid adverse modification (e.g., if the remaining habitat is relatively small and the species is near extinction), the public may express more concern over possible restrictions than in a situation where those restrictions are likely to be more moderate.

In summary, these studies, in conjunction with public comments on this and previous designations, suggest that costs may result from public perception of how critical habitat regulations will be implemented. However, given the differences between the situations analyzed in these studies and the proposed designation for the two butterflies, we do not attempt to apply the findings of these studies in this analysis. Instead, to evaluate the possible magnitude of perception-related costs, we conduct a bounding analysis, described in greater detail in the remainder of this memorandum.

SECTION 2. ANALYSIS

In the case of proposed critical habitat for the two butterflies, the habitat is located in rural areas where residential and commercial development pressure is low. Thus, the value of these private acres is driven by their next best use, in this case, grazing or crop production. Despite the fact that a section 7 nexus is unlikely for grazing or farming

activities conducted on private acres, the agricultural community may perceive that the designation of certain parcels as critical habitat will limit future activities in those areas.

To evaluate the possible magnitude of such costs, we conduct a bounding analysis. We estimate per-acre land values for private lands (excluding those already permanently protected by organizations including The Nature Conservancy and The Michigan Nature Association) within the proposed designation. Public perception of the effect of critical habitat may diminish land values by some percent of these total values. Data limitations prevent us from estimating the size of this percent reduction. However, any diminishment in property value cannot exceed the total value of the property.

Assuming the entire value of the parcel is lost would likely overstate costs because many properties may have alternative uses that the public would not construe as “lost” (e.g., land that is currently used for crops might still be used for grazing). In addition, these properties may experience perception-related effects as a result of the presence of the listed butterflies, thus reducing the incremental portion of the cost attributable to critical habitat. Therefore, the property values reported in this memorandum should not be construed as a best estimate of the likely cost of the proposed designation; rather, they represent an upper bound on possible perception-related effects.

The remainder of this section provides our detailed calculations. To estimate this upper bound, we first quantify the amount of privately-owned non-conservation land within the designation. Then, we estimate the per-acre value of these lands, at the county level where possible. Finally, we estimate the total market value of these acres. Additional detail describing these steps is provided in the following sections.

STEP 1 - IDENTIFY THE AMOUNT OF PRIVATELY-OWNED NON-CONSERVATION LAND WITHIN THE DESIGNATION

Through GIS analysis of land ownership data, we determine that the designation intersects 10,494 acres of privately-owned non-conservation land. Exhibit 1 summarizes these acres by unit.

EXHIBIT 1. ACREAGE OF PRIVATELY-OWNED NON-CONSERVATION LAND WITHIN CRITICAL HABITAT BY UNIT

UNIT	OVERLAPPING UNIT	ACREAGE (ACRES)
DS Minnesota 01	PS Minnesota 01	831
DS Minnesota 02	PS Minnesota 02	905
DS Minnesota 03	PS Minnesota 03	126
DS Minnesota 07	PS Minnesota 07	151
DS Minnesota 10	PS Minnesota 10	19
DS Minnesota 12		549
DS North Dakota 01	PS North Dakota 01	2
DS North Dakota 03		1,370
DS North Dakota 04		197
DS North Dakota 05		1,832
DS North Dakota 07		280
DS North Dakota 08		123
DS North Dakota 09		360
DS North Dakota 11		47
DS North Dakota 12		13
DS North Dakota 14		242
DS South Dakota 03	PS South Dakota 03	425
DS South Dakota 07	PS South Dakota 07	41
DS South Dakota 09	PS South Dakota 09	26
DS South Dakota 11	PS South Dakota 11	14
DS South Dakota 12	PS South Dakota 12	238
DS South Dakota 13	PS South Dakota 13	18
DS South Dakota 19		326
DS South Dakota 20		255
DS South Dakota 21		198
DS South Dakota 22		133
PS Iowa 03		26
PS Iowa 04		29
PS Iowa 05		75
PS Iowa 08		55
PS Iowa 09		192
PS Iowa 10		139
PS Michigan 02		15
PS Michigan 03		332
PS Michigan 04		245
PS Michigan 05		14
PS Michigan 06		34

UNIT	OVERLAPPING UNIT	ACREAGE (ACRES)
PS Michigan 07		36
PS Michigan 08		312
PS Michigan 09		34
PS Minnesota 11		22
PS Minnesota 13		84
PS Wisconsin 01		10
PS Wisconsin 02		118
TOTAL		10,494
Notes: Acreages reflect values obtained from GIS Analysis. Calculations use unrounded acreage values; thus totals may not sum.		

STEP 2 - IDENTIFY PER-ACRE VALUES FOR THESE LANDS

For the purposes of this analysis, we rely on per-acre values for cropland and pastureland. Where available, we applied county specific values; otherwise, we apply a statewide average. Land values are obtained from various sources, including from the National Agricultural Statistics Service and the North Dakota Department of Trust Lands. Because we do not know the specific use of these lands, we develop two estimates of the per-acre value. We use values for pastureland and cropland for the low-end and high-end estimates, respectively.

EXHIBIT 2. PRIVATE LAND VALUES PER-ACRE (2013\$)

STATE	COUNTY	LAND VALUE PER-ACRE		NOTES AND SOURCE INFORMATION
		LOW	HIGH	
Iowa ⁽¹⁾	All counties	\$3,400	\$8,600	Low represents pastureland average value; high represents cropland average value. Based on 2013 June Survey of agricultural producers.
Michigan ⁽¹⁾	All counties	\$2,700	\$4,600	
Minnesota ⁽²⁾	All counties	\$1,750	\$4,850	
North Dakota ⁽³⁾	McHenry County	\$559	\$1,370	Low represents non-irrigated hayland or pastureland; high represents non-irrigated cropland value. Based on a survey of 4,000 agricultural producers in North Dakota in January - February 2014.
	McKenzie County	\$400	\$767	
	Ransom County	\$1,100	\$3,390	
	Richland County	\$1,625	\$4,156	
	Rolette County	\$477	\$1,367	
	Wells County	\$675	\$2,252	
South Dakota ⁽⁴⁾	Brookings County	\$2,395	\$6,666	Low represents rangeland value; high represents non-irrigated cropland, both at average productivity. Based on a South Dakota State University study of agricultural lenders, Farm Service Agency officials, rural appraisers, assessors, realtors, professional farm managers, and Extension field specialists familiar with farmland market trends in their localities.
	Day County	\$1,671	\$4,250	
	Deuel County	\$1,823	\$5,217	
	Moody County	\$3,093	\$8,347	
	Roberts County	\$1,761	\$5,000	
Wisconsin ⁽¹⁾	All counties	\$2,150	\$4,300	Low represents pastureland average value; high represents cropland average value. Based on 2013 June Survey of agricultural producers.

Sources:

- (1) U.S. Department of Agriculture, National Agricultural Statistics Service. Land Values, 2013 Summary. August 2, 2013. Available at: <http://usda.mannlib.cornell.edu/usda/current/AgriLandVa/AgriLandVa-08-02-2013.pdf>, accessed May 9, 2014.
- (2) U.S. Department of Agriculture, National Agricultural Statistics Service. Minnesota Ag News - Land Value. August 2, 2013. Available at: http://www.nass.usda.gov/Statistics_by_State/Minnesota/Publications/Prices_Press_Releases/2013/MN_2013FARM%20VALUE.pdf, accessed May 9, 2014.
- (3) North Dakota Department of Trust Lands. 2014 County Rents and Values Survey, North Dakota, March 2014. Available at: <http://land.nd.gov/docs/surface/ctyrent14.pdf>, accessed May 9, 2014. (Note that these values were collected through a survey implemented in January and February 2014. Thus, adjusting these estimates to 2013 current dollars is unlikely to result in significantly different estimates.)
- (4) Janssen, Larry; Pflueger, Burton; and McMurtry, Bronc. South Dakota Agricultural Land Market Trends 1991 - 2013. South Dakota State University, Agricultural Experiment Station, U.S. Department of Agriculture. Available at: <http://igrow.org/up/resources/03-7007-2013.pdf>, accessed May 9, 2014.

**STEP 3 - ESTIMATE THE TOTAL VALUE OF PRIVATELY-OWNED NON-CONSERVATION
LAND IN THE PROPOSED CRITICAL HABITAT**

Finally, we multiply the acreage estimates in Exhibit 1 by the per-acre values in Exhibit 2 to estimate the total value of the relevant acres. Exhibit 3 displays the results by unit. The total value of privately-owned non-conservation lands in the designation is estimated to be \$15 million to \$38 million. As described above, because we do not know the specific use of these lands, we estimate a range of values. The low value assumes the lands are used for pasture, while the high value assumes the lands are used for crops.

**EXHIBIT 3. ESTIMATE OF TOTAL VALUE OF ACRES POSSIBLY SUBJECT TO PERCEPTION
IMPACTS, 2013 DOLLARS**

UNIT	OVERLAPPING UNIT	TOTAL VALUE	
		LOW	HIGH
DS Minnesota 01	PS Minnesota 01	\$1,500,000	\$4,000,000
DS Minnesota 02	PS Minnesota 02	\$1,600,000	\$4,400,000
DS Minnesota 03	PS Minnesota 03	\$220,000	\$610,000
DS Minnesota 07	PS Minnesota 07	\$270,000	\$730,000
DS Minnesota 10	PS Minnesota 10	\$33,000	\$90,000
DS Minnesota 12		\$960,000	\$2,700,000
DS North Dakota 01	PS North Dakota 01	\$4,000	\$10,000
DS North Dakota 03		\$770,000	\$1,900,000
DS North Dakota 04		\$110,000	\$270,000
DS North Dakota 05		\$1,000,000	\$2,500,000
DS North Dakota 07		\$160,000	\$380,000
DS North Dakota 08		\$69,000	\$170,000
DS North Dakota 09		\$170,000	\$490,000
DS North Dakota 11		\$19,000	\$36,000
DS North Dakota 12		\$5,000	\$10,000
DS North Dakota 14		\$160,000	\$540,000
DS South Dakota 03	PS South Dakota 03	\$780,000	\$2,200,000
DS South Dakota 07	PS South Dakota 07	\$73,000	\$210,000
DS South Dakota 09	PS South Dakota 09	\$46,000	\$130,000
DS South Dakota 11	PS South Dakota 11	\$25,000	\$71,000
DS South Dakota 12	PS South Dakota 12	\$400,000	\$1,000,000
DS South Dakota 13	PS South Dakota 13	\$31,000	\$78,000
DS South Dakota 19		\$570,000	\$1,600,000
DS South Dakota 20		\$610,000	\$1,700,000
DS South Dakota 21		\$470,000	\$1,300,000
DS South Dakota 22		\$320,000	\$890,000

UNIT	OVERLAPPING UNIT	TOTAL VALUE	
		LOW	HIGH
PS Iowa 03		\$89,000	\$230,000
PS Iowa 04		\$97,000	\$250,000
PS Iowa 05		\$250,000	\$640,000
PS Iowa 08		\$190,000	\$480,000
PS Iowa 09		\$650,000	\$1,600,000
PS Iowa 10		\$470,000	\$1,200,000
PS Michigan 02		\$40,000	\$67,000
PS Michigan 03		\$900,000	\$1,500,000
PS Michigan 04		\$660,000	\$1,100,000
PS Michigan 05		\$39,000	\$66,000
PS Michigan 06		\$91,000	\$160,000
PS Michigan 07		\$97,000	\$170,000
PS Michigan 08		\$840,000	\$1,400,000
PS Michigan 09		\$93,000	\$160,000
PS Minnesota 11		\$38,000	\$110,000
PS Minnesota 13		\$150,000	\$410,000
PS Wisconsin 01		\$21,000	\$42,000
PS Wisconsin 02		\$250,000	\$510,000
TOTAL		\$15,000,000	\$38,000,000

SECTION 3. CONCLUSION

Land ownership data suggest that the designation intersects approximately 10,494 acres of privately-owned non-conservation lands. If public perception causes the value of critical habitat acres to be diminished, these acres are those most likely to be affected. Due to existing data limitations regarding the probability that such effects will occur, and the likely degree to which property values will be incrementally affected by this designation (above and beyond potential perception effects resulting from the presence of the butterflies), we are unable to estimate the magnitude of perception-related costs resulting from this designation. However, the cost cannot exceed the total value of affected properties. Based on the analysis presented in this memorandum, current land values suggest that even if such costs occur, the rule is unlikely to reach the threshold of an economically significant rulemaking when perception effects are combined with the other incremental costs that could result from designation of critical habitat for the two butterflies.

SECTION 4. REFERENCES

- Industrial Economics, Incorporated. 2014. "Screening Analysis of the Likely Economic Impacts of Critical Habitat Designation for the Dakota Skipper and Poweshiek Skipperling." Delivered to the U.S. Fish and Wildlife Service on September 8.
- Janssen, Larry; Pflueger, Burton; and McMurtry, Bronc. South Dakota Agricultural Land Market Trends 1991 - 2013. South Dakota State University, Agricultural Experiment Station, U.S. Department of Agriculture. Available at: <http://igrow.org/up/resources/03-7007-2013.pdf>, accessed May 9, 2014.
- List, John A., Michael Margolis, and Daniel E. Osgood. 2006. *Is the Endangered Species Act Endangering Species?* National Bureau of Economic Research Working Paper Series.
- Lueck, Dean and Jeffrey A. Michael. 2003. "Preemptive Habitat Destruction Under the Endangered Species Act." *Journal of Law and Economics*. 46:27-60.
- North Dakota Department of Trust Lands. 2014 County Rents and Values Survey, North Dakota, March 2014. Available at: <http://land.nd.gov/docs/surface/ctyrent14.pdf>, accessed May 9, 2014.
- Public comments on the October 24, 2013 proposals to list the Dakota skipper and Poweshiek skipperling along with critical habitat. Submitted by F. William Whipple, President, Whipple Ranch Inc., received by the Service December 27, 2013.
- U.S. Department of Agriculture, National Agricultural Statistics Service. Land Values, 2013 Summary. August 2, 2013. Available at: <http://usda.mannlib.cornell.edu/usda/current/AgriLandVa/AgriLandVa-08-02-2013.pdf>, accessed May 9, 2014.
- U.S. Department of Agriculture, National Agricultural Statistics Service. Minnesota Ag News - Land Value. August 2, 2013. Available at: http://www.nass.usda.gov/Statistics_by_State/Minnesota/Publications/Prices_Press_Releases/2013/MN_2013FARM%20VALUE.pdf, accessed May 9, 2014.
- U.S. Fish and Wildlife Service. 2013. May 6, 2014. Incremental Effects Memorandum for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Dakota skipper (*Hesperia dacotae*) and the Poweshiek skipperling (*Oarisma poweshiek*).
- Zabel, Jeffrey E. and Robert W. Paterson. 2006. "The Effects of Critical Habitat Designation on Housing Supply: An Analysis of California Housing Construction Activity." *Journal of Regional Science*. 46(1): 67-95.